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Sex Attractant for *Diarsia pseudorosaria*, a Defoliator of Ryegrass (Lepidoptera: Noctuidae)[1]

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Abstract.—A combination of (Z)-11-hexadecen-1-ol acetate (Z11-16:Ac) and (Z)-9-hexadecen-1-ol acetate (Z9-16:Ac) is a sex attractant for male *Diarsia pseudorosaria* (Hardwick) (Lepidoptera: Noctuidae). Neither compound alone produced trap captures. No significant difference in trap capture occurred when baits had ratios of 1.5:1 to 4:1 of Z11-16:Ac to Z9-16:Ac, respectively. The effective dosages of a 2.3:1 ratio of Z11-16:Ac to Z9-16:Ac ranged from 3 to 32 mg per bait. Pheromone traps baited with the two-component bait were superior to black light traps for monitoring seasonal flight.

Diarsia pseudorosaria (Hardwick) is primarily a grass feeder that occurs throughout the western United States and Canada (Crumb, 1956). This is one of several species in a complex of cutworms that defoliate grasses grown for seed in the Pacific Northwest (Kamm, 1984). During field tests with candidate sex attractants for *Pseudaletia unipuncta* (Haworth) (Kamm et al., 1982), we discovered a potent two-component sex attractant for male *D. pseudorosaria.* We report here results of field trials to identify the effective dose and ratio of the two compounds. Then, seasonal flight was monitored with black light traps and the two-component bait in pheromone traps.

MATERIALS AND METHODS

Field tests were conducted near Albany, Oregon, in commercial fields of ryegrass grown for seed. Pherocon® 1C traps were suspended from steel rods just above the canopy of ryegrass. In dosage and ratio tests, traps in each replicate were positioned in a straight line 20 m apart and replicates spaced at least 100 m apart. Four replications were used for each test bait (including an unbaited check trap), and traps were rerandomized daily. Tests remained in the field from 4–11 days. Four sex attractant traps and one battery-powered black light trap were used to characterize the seasonal flight. Sex attractant traps were serviced twice each week and baits (7 mg Z11-16:Ac and 3 mg Z9-16:Ac) changed monthly.

The test chemicals (Farchan Division, Story Chemical Co., Willoughby, OH)

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Table 1. Mean daily number of male *Diarsia pseudorosaria* captured per trap.

Test no.	No. of days tested	μg/dispenser Z11-16:Ac to Z9-16:Ac	$\bar{x}$ males/trap/day
1	11	1000:0	0.05 a
		1000:40	0.96 a
		1000:70	11.4 b
		1000:100	16.5 b
		Check	0.18 a
2	5	2000:0	0
		2000:100	0.83 a
		1800:200	3.4 b
		1600:400	8.1 c
		1400:600	10.9 c
		1200:800	7.6 c
		1000:1000	3.9 b
		800:1200	1.3 a
		0:2000	0
3	4	70:30	0.8 a
		210:90	1.3 ab
		700:300	2.2 bc
		2100:900	5.3 cd
		7000:3000	8.8 d
4	5	1400:600	4.8 a
		2800:1200	6.5 ab
		5600:2400	6.6 ab
		11,200:4800	7.1 ab
		22,400:9600	10.2 b

[a] Mean of 4 replications. Numbers followed by the same letter within a test do not differ significantly ($P = 0.05$) Duncan's new multiple range test.

were analyzed by capillary gas chromatography to insure freedom from geometrical isomers (<1%) and extraneous materials (<2%). Dichloromethane solutions of test compounds were impregnated in No. 1 red rubber sleeve stoppers as previously described (Kamm and McDonough, 1980).

Results and Discussion

Males clearly were attracted to a combination of (Z)-11-hexadecen-1-ol acetate (Z11-16:Ac) and (Z)-9-hexadecen-1-ol acetate (Z9-16:Ac) but not to Z11-16:Ac alone (Table 1, test 1). Trap captures were statistically equivalent when the ratio of the two components was in the range of 1.5 to 4:1 (Test 2). Again, males were not attracted to baits with only Z11-16:Ac or to Z9-16:Ac.

Test 3 was designed to identify the effective dosage of the two components, but the results suggested that an even higher dose was required. In test 4, the dosage was increased further and the effective dosages ranged from 3 to 33 mg per dispenser (Test 4). These data agree with that of other insects where maximum response was obtained with an optimum ratio of two components over a wide range of concentrations (Bellas and Bartell, 1983). In addition to the compounds found attractive, Z11-16:AL, Z9-16:AL, Z11-16:OH, Z9-14:Ac and Z7-12:Ac were tested in the field at concentrations of 0.1–1 mg, but none resulted in trap capture of *D. pseudorosaria.*

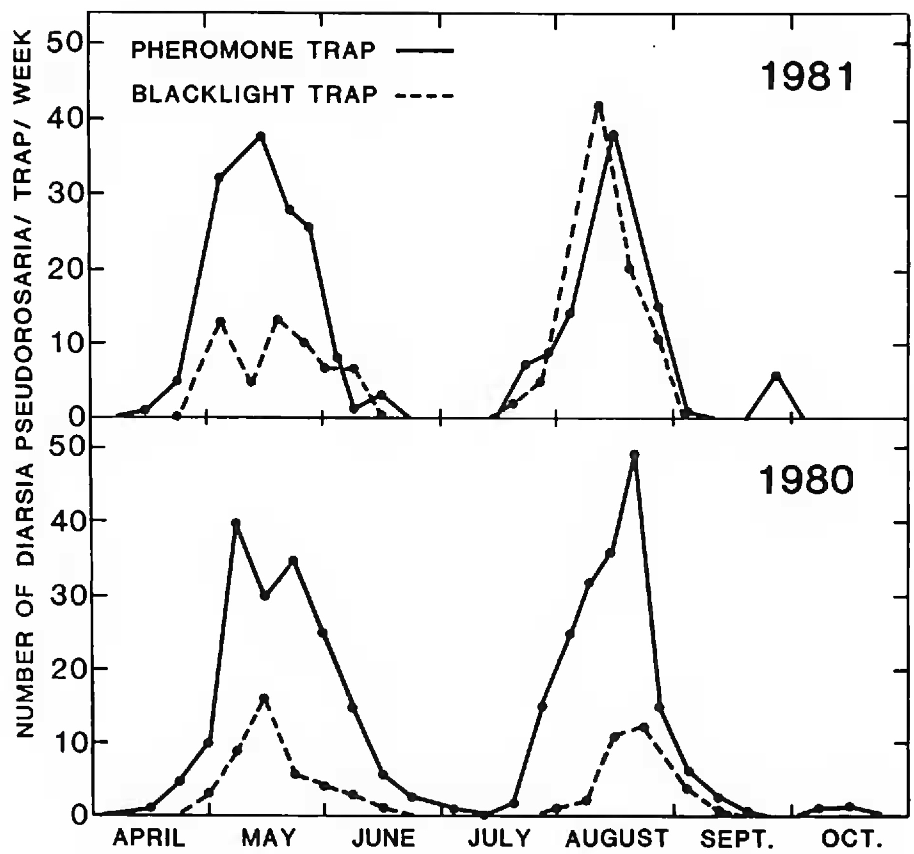

Figure 1. Weekly trap captures of *Diarsia pseudorosaria* in commercial ryegrass with pheromone traps baited with sex attractant and a black light trap.

The seasonal flight of *D. pseudorosaria* was monitored with the two-component bait in pheromone traps and a black light trap. The pheromone traps clearly captured more moths per trap (all males) than were captured in the black light trap that captured both males and females (Fig. 1). We cannot account for the similar numbers captured during the second generation of moths in 1981 but suspect that the black light trap captured a higher ratio of females than were captured during the first generation flight. The pheromone traps also captured moths earlier in the spring and later in the fall compared with catches in the black light trap. In general, monitoring *D. pseudorosaria* populations with pheromone traps was more reliable, logistically simpler, and more cost effective than black light traps.

Z11-16:Ac is a common component of sex attractants for a growing number of species, and Z9-16:Ac is also a component of several species (Ando et al., 1977; Steck et al., 1979). Successful reproduction and partitioning of resources is basic to survival of a species. As pheromone components of more species become known, our understanding of the channels of chemical communication will provide useful insights to the parameters that mold phylogeny and speciation of insects.

Literature Cited

Ando, T., K. Kishino, S. Tatsuki, H. Nakajima, S. Yoshida, and N. Takahashi. 1977. Identification of the female sex pheromone of the rice green caterpillar. Agric. Biol. Chem., 41:1819–1820.

Bellas, T. E., and R. J. Bartell. 1983. Dose-response relationship for two components of the sex pheromone of lightbrown apple moth, *Epiphyas postvittana* (Lepidoptera: Tortricidae). J. Chem. Ecol., 9:715–725.

Crumb, S. E. 1956. The larvae of Phalaenidae. USDA Tech. Bull. No. 1135, 356 pp.

Kamm, J. A. 1984. Cutworm defoliators of ryegrass. Pan-Pacific Entomol. 61:68–72.

———, and L. M. McDonough. 1980. Synergism of the sex pheromone of the cranberry girdler. Environ. Entomol., 9:795–797.

———, ———, and R. D. Gustin. 1982. Armyworm (Lepidoptera: Noctuidae) sex pheromone: field tests. Environ. Entomol., 11:917–919.

Steck, W. F., M. D. Chisholm, B. K. Bailey, and E. W. Underhill. 1979. Moth sex attractants found by systematic field testing of 3-component acetate-aldehyde candidate lures. Can. Entomol., 111:1263–1269.